

REMARKS

Entry of this Amendment and favorable reconsideration of this application, as presently amended, is respectfully requested.

A two-month extension of time, together with the associated fee is filed herewith.

In this Amendment, Claim 2 has been amended to more particularly point out and distinctly claim applicants' contribution to the art and to expressly exclude a prepreg step by virtue of the transitional term "consisting of". No new matter or new issues are believed to be present in this amendment.

Claims 2, 10 and 16-24 are pending in this application.

The rejection of Claim 19 under 35 U.S.C. § 102(b) or 35 U.S.C. § 103(a) in view of *Cundiff* is traversed and reconsideration is respectfully requested. The Official Action points out that the reference uses a sealing material and prepreg material and concludes that it would have been "obvious to one of ordinary skill in the art at the time the invention was made to employ the adhesive film and prepreg layers to send the core ...".

In contrast, the present invention employs no prepreg layers. The Official Action fails to provide any reason, suggestion or motivation for a person skilled in the art to exclude prepreg materials. Hence, the reference neither describes nor renders the claimed invention obvious.

Withdrawal of the rejection is requested in view of the amendment filed herewith.

Claims 2, 10 and 16-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Cundiff* and *Lubin*, further in view of *Fellman, et al.* (U.S. 4,968,545), *Ahrens* (U.S. 4,323,623), *Browne* (U.S. 4,861,649), all of record, and further in view of EP 588,437.

Applicants respectfully traverse these rejections and request reconsideration for reasons discussed herein.

Applicants' invention is related to a honeycomb sandwich composite panel made by using an RTM (Resin Transfer Molding) process. In previously known methods of forming honeycomb sandwich panels, disclosed in the specification at page 1, line 24, to page 2, line 7, and as illustrated by *Cundiff*, in order to keep an impregnated resin from flowing into a honeycomb core, a prepreg material is used as a raw material. In fact, *Cundiff* teaches that the prepreg is essential. However, the use of the prepreg material requires high material cost and expensive facilities for the storage of materials and for a curing operation, in particular, it would create a problem of cost reduction of composite materials.

Applicants have discovered a method of forming a honeycomb sandwich composite panel without using the prepreg material. Applicants' invention, recited in the rejected claims, forms the panel by providing a thermosetting sealing film material containing glass microspheres between a dry fabric and both sides of the honeycomb core. The use of the thermosetting sealing material with glass microspheres (microballoons) controls viscosity of the resin film and has adhesive property for joining the honeycomb core to the dry fabric and with a sufficient sealing effect. Specific structures are shown in the specification at page 7, lines 3-25 and Figures 3 to 6.

The claims as amended recite "consisting of" as the transitional phrase to thereby exclude the prepreg material which is an essential part of the *Cundiff* invention.

In contrast to Applicants' invention, *Cundiff* discloses the honeycomb sandwich composite panel by using an RTM (Resin Transfer Molding) process with the honeycomb core, adhesive film and prepreg material and dry fabric.

Accordingly, *Cundiff* discloses, as an essential component, the prepreg material as a composite of the honeycomb sandwich composite, and hence there is a patentably distinct difference between Applicants' invention and that of *Cundiff*. As discussed above, Applicants' invention uses the resin film including glass microspheres (microballoons) to adjust the viscosity of the resin film and having an adhesive property for joining the honeycomb core to the dry fabric and a sufficient sealing effect to prevent the resin from flowing into the honeycomb core during resin impregnation. This feature is not suggested or taught by *Cundiff*. Nothing in *Cundiff* would motivate a person skilled in the art to omit the prepreg component.

The remaining references relied on would not motivate persons skilled in the art to modify the *Cundiff* invention.

Regarding *Lubin*, as the Examiner indicated, the "Handbook of Composites" discloses that a material which cures during bonding is a thermosetting material. Accordingly, *Lubin* only discloses that a curable material is in fact thermosetting, there is no teaching or suggestion about the use of the thermosetting sealing material including glass microspheres as sealing material. Furthermore, there is no teaching or suggestion of using the thermosetting sealing material including glass microspheres instead of the prepreg material.

Accordingly, even if the teachings of *Cundiff* are modified in view of *Lubin*, the invention recited in Claims 2, 10 and 16 to 23 would not be obtained.

For these reasons, Applicants believe that Claims 2, 10 and 16 to 23 are patentable over the references and respectfully request reconsideration of this application.

The Examiner indicated, based on *Fellman, et al.*, *Ahrens, et al.*, and *Browne*, that the use of syntactic foam which included resin and glass microspheres instead of the resin film and/or prepreg material would have been obvious.

However, Applicants respectfully state that *Fellman, et al.*, *Ahrens, et al.*, and *Browne* disclose the laminated structure of the prepreg and the syntactic foam. Accordingly, the prepreg material is used as one of composite materials for forming the product. Hence, there is no suggestion or teaching of forming the honeycomb sandwich composite panel without the prepreg material.

Thus, even if the combination of *Cundiff* and *Lubin* is modified in view of *Fellman*, *Ahrens* and *Browne*, the invention recited in Claims 2, 10 and 16-23 would not be obtained.

It is clear that *Cundiff* fails to suggest that the prepreg layer can be omitted. The Official Action attempts to show that *Fellman* suggests that a glass microsphere containing layer would have suggested itself as a replacement for the prepreg layer. Yet, *Fellman* clearly teaches not to eliminate the prepreg layer. In col. 2, line 60 *et seq.* *Fellman* teaches to use both the prepreg layer and the layer containing microspheres.

Browne also teaches the presence of both the prepreg layer 3 and the syntactic form layer 5; see Figure 1.

Ahrens also shows both types of layers present.

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Thus, it is manifest that the secondary references fail completely to support the position taken in the Official Action. They do not, in fact, teach that the resin-glass microsphere layer is a replacement for the prepreg layer. Hence motivation for replacing the prepreg layer is entirely lacking in these three secondary references.

With respect to the EP patent document, it, too, does not suggest eliminating the prepreg layer in the construction of *Cundiff*.

Notwithstanding the detailed Official Action and numerous references, the fact remains that the prior art fails to suggest omitting the prepreg and forming Applicants' product.

For this reason, Applicants believe that the rejected claims are patentable over the references and respectfully request the reconsideration of this application.

In view of above, Applicants request that the rejection be withdrawn and the claims be allowed at the Examiner's earliest convenience.

Respectfully submitted,

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Version with Markings to Show Changes Made

Amendments in the Claims

In accordance with 37 C.F.R. § 1.121(c) the following version of the claims as rewritten by the foregoing amendment shows all the changes made relative to the previous version of the claims.

Claims 2 and 19 are amended.

2. (Three Times Amended) A method of forming a honeycomb sandwich composite panel [consisting essentially of] by a resin transfer molding process consisting of:

stacking a thermosetting sealing material on at least one side of a honeycomb core, said thermosetting sealing material having an adhesive property and being a resin film including glass microspheres;

stacking a dry fabric on said thermosetting sealing material;

hardening said sealing material by heating said sealing material and said dry fabric to the curing temperature of said sealing material and maintaining this temperature for a specified curing time period of said sealing material;

impregnating said dry fabric with a thermosetting resin while varying the temperature of said sealing material and said dry fabric to a resin impregnating temperature and maintaining this temperature for a specified period of time; and

hardening the resin impregnated into said dry fabric by heating said sealing material and said dry fabric to the curing temperature of said thermosetting resin and hot-pressing them for a specified period of time.

19. (Amended) A method of forming a honeycomb sandwich composite panel by a resin transfer molding process consisting essentially of:

stacking a plurality of thermosetting sealing materials on at least one of sides of a honeycomb; said each of thermosetting materials having an adhesive property, and including at least one layer of short fibers and non-woven fabric of glues;

stacking a dry fabric on said thermosetting sealing materials;

hardening said [dry fabric with a thermosetting resin while varying the] sealing materials by heating to a sufficient temperature and maintaining this temperature for a specified period of time; impregnating the dry fabric with a thermosetting resin and hardening the resin impregnated into said dry fabric by heating said [sealing material] resin and [say] said fabric to the curing temperature of said thermosetting resin and hot-pressing them for a specified time period.